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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/590,234

08/22/2006

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Q95621

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23373 7590 12/03/2009  
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EXAMINER

KURTZ, BENJAMIN M

ART UNIT

PAPER NUMBER

1797

NOTIFICATION DATE

DELIVERY MODE

12/03/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/590,234	<b>Applicant(s)</b> AIZAWA, MASANOBU	
	<b>Examiner</b> BENJAMIN KURTZ	<b>Art Unit</b> 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 November 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-5 and 7-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-5 and 7-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

Claims 1, 3-5, 7-16 are pending.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**1. Claims 1, 3-5 and 9-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lai et al. US 5 871 650 and Verduijn et al. US 6 090 289 and Goldsmith et al. US 5 221 484.**

Claims 1 and 3-5, Lai, Verduijn and Goldsmith teach a separation membrane comprising: a porous substrate which is made of ceramic sintered body of which a main ingredient is alumina, and a zeolite membrane which is formed over the surface of the porous substrate, wherein the porous substrate comprises a base layer and a foundation layer which is formed on the base layer and, wherein the separation membrane is characterized in that a mean pore diameter of the foundation layer is smaller than a mean pore diameter of the base layer (Lai, col. 4, line 50-55, col. 5, line 45 – col. 6, line 5; Verduijn, col. 4, lines 47-64, col. 5, lines 1-47; Goldsmith, col. 6, lines

Art Unit: 1797

60-66, col. 7, lines 4-36, col. 8, lines 7-13). None of these references teach the claimed nitrogen gas permeation rate.

Lai further teaches the claimed thickness of the foundation layer and that the substrate pore size and thickness should be chosen such that the mass transfer resistance does not limit the flux of material permeating through the membrane (col. 5, lines 60-66). One skilled in the art would be led by the teachings of Lai to adjust the pore size and thickness of the base layer and foundation layer to achieve a suitable flux of material through the membrane.

Goldsmith further teaches the mean pore diameter of the base layer is about 5 microns or greater, and the mean pore diameter of the foundation layer is 0.1-5 microns (col. 7, lines 4-36); and the thickness of the foundation layer is less than 100 microns (col. 7, lines 24-36).

Verduijn further teaches the thickness of the base layer is 3mm (col. 16, lines 24-30); and the thickness of the foundation layer is in the range of 0.1-150 microns (col. 5, lines 1-12).

All the claimed dimensions are known in the prior art. Verduijn teaches the claimed thickness of the base layer as detailed above and Goldsmith teaches the claimed pore diameters of the base layer and the foundation layer as detailed above. The claimed nitrogen gas permeation rates are based on the average pore diameter of the membrane. The claimed dimensions of the pore diameters are known in the art and one of ordinary skill in the art would be lead by the teachings of Lai to adjust the pore size to achieve optimal flux of material through the membrane. A membrane with the

Art Unit: 1797

claimed pore dimensions and thickness would inherently have the claimed nitrogen permeation rates. Also, the separation factor is dependent on what materials are being separated. The separation factor will be different for separating ethanol from water than a separation factor for separating ethanol from benzene. Therefore, the separation factor is deemed to be a process limitation that does not add any further structural limitations to the claim. Even so, the recitation of the separation factor being 1000 or more would be an inherent property of the membrane. The separation factor is determined by the physical structure of the membrane, such as, materials used, pore size and the thickness of the different layers. All of the physical characteristics are known in the art and the combination of the characteristics would have been obvious to one of ordinary skill in the art. The separation factor is therefore deemed to be inherent in the membrane taught by the prior art. The claims would have been obvious because the technique for improving a particular class of devices was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

Claims 9, 10, 13 and 14, Lai, Verduijn and Goldsmith further teach the porosity of the substrate is in the range of 20-50% (Lai, col. 6, line 1), the porosity if the substrate is 33% (Verduijn, col. 16, lines 24-30) and the porosity of the substrate is 40% or greater (col. 7, lines 14-18); and the total content of Ca and K included in the porous substrate is not more than 0.5 mol%, Lai, Verduijn and Goldsmith do not mention any Ca or K being present anywhere in the disclosure.

Claims 11 and 12, Verduijn further teaches the porous substrate has a pore size in the range on 0.08-0.16 microns with a narrow pore size distribution (col. 5, lines 30-35). Therefore the maximum pore diameter would not be more than 7 microns. How the maximum pore diameter is determined is a process limitation that does not further structurally limit the membrane.

Claim 15 recites a method for making the membrane of claim 1. Lai, Verduijn and Goldsmith teach the membrane of claim 1 as detailed above. “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 227 USDQ 964 (1985). The process of making the membrane according to Lai, Verduijn and Goldsmith is deemed a structural alternative to the recited method of claim 15.

Claim 16 recites only an intended use of the separation membrane that does not add any further structural limitations to the apparatus of claim 1. The separation membrane as taught by Lai, Verduijn and Goldsmith is capable to performing the recited intended use.

**2. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lai ‘650, Verduijn ‘289, Goldsmith ‘484 and Moyer et al. US 5 198 007.**

Lai, Verduijn and Goldsmith teach the separation membrane of claim 1 as detailed above but do not teach the claimed aspect ratio of the particles used to form the foundation layer. Moyer teaches a sintered ceramic media of alumina made of particles. Moyer teaches the aspect ratio of the particles determines the pore size of the filter. The claimed aspect ratios would have been obvious because the design incentives, to manipulate the pore sizes to obtain a suitable porous product, provided a reason to make an adaptation, and the invention resulted from application of prior knowledge in a predictable manner, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

### ***Response to Arguments***

3. Applicant's arguments filed 9/29/09 have been fully considered but they are not persuasive.

In response to applicant's argument that the object of claim 1 is **not** to choose the substrate pore size and thickness such that the mass transfer resistance does not limit the flux of material permeating through the membrane, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Applicant states that the separation membrane of claim 1 provides unpredictable results in terms of permeation performance. Applicant has not provided any evidence

Art Unit: 1797

showing unpredictable results. The invention of claim 1 is merely the combination of known membrane structures and optimization of the various physical parameters of the membrane and optimization of the physical parameters is further taught in the prior art to provide various advantages as detailed in the rejection above. Figure 6 merely shows predictable results, as nitrogen is allowed to flow faster through the membrane the flux increases. The nitrogen permeation rate and flux are determined by the pore sizes, layer thicknesses and the material of the membrane. All these physical characteristics are taught by the prior art and therefore the nitrogen permeation rate is deemed to be inherent.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

### ***Conclusion***

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENJAMIN KURTZ whose telephone number is



Art Unit: 1797

(571)272-8211. The examiner can normally be reached on Monday through Friday 8:00am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Benjamin Kurtz  
Examiner  
Art Unit 1797

/Krishnan S Menon/  
Primary Examiner, Art Unit 1797